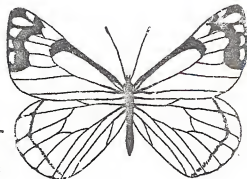


MONTANA DEPARTMENT OF  
STATE LANDS

DIVISION OF FORESTRY

INSECT AND DISEASE REPORT



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Report 82-1



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SOME INSECT PESTS OF ORNAMENTAL

TREES IN MONTANA

by

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The statements in this report concerning control by pesticides are not intended to serve as substitutes for pesticide labels. Be sure, before using any of the materials described in this report, to read the label carefully, particularly those sections dealing with recommended dosages and precautions for handling and use. Use of any chemical or combination of chemicals listed here is at the user's risk. Listing or recommendation of chemicals in this report does not imply endorsement by the Montana Division of Forestry. ALWAYS READ AND FOLLOW THE DIRECTIONS ON THE PESTICIDE CONTAINER.

FOREST TENT CATERPILLAR  
Malacosoma disstria Hubner

Hosts: Green ash, American elm, Siberian elm, cottonwood, aspen, alder, birch and most other hardwoods.

Life Cycle: Overwinters as eggs in ring-shaped masses on twigs. Larvae hatch when leaves begin to unfold and feed for 5 to 6 weeks. They do not spin tents, but form silken mats on trunks or branches when they rest. Pupation takes place in July inside cocoons of pale yellow silk. Cocoons are formed in folded leaves, bark crevices, or other sheltered sites. Moths emerge in late July and the females lay egg masses which encircle small twigs. The eggs are cemented together and are coated with a frothy, glue-like substance which hardens and turns a glossy brown.

Damage: Can mine buds and completely eat all the leaves off hosts. After 3 or more years, some tree mortality may occur, but reduced growth and some branch killing are the usual extent of damage by outbreaks.

Identification: Larvae are on trees from mid-May to July. Small larvae are black with long hairs and feed together as a group. Mature larvae are dark brown with bluish heads and blue-black sides. There is a row of whitish or yellowish keyhole-shaped spots on the back, with patches of fine orange lines. The larger larvae feed singly.

Control: Control is best accomplished by spraying the larval stage. The bacterium

Bacillus Thuringiensis (Bt) is registered for aerial application. A number of materials are registered for ground application, including Bt, Cygon, Diazinon, Malathion, Methoxychlor, Orthene, and Sevin. Spraying should begin soon after the buds have opened, but before the leaves are fully formed, and be repeated in approximately two weeks.

WESTERN SPRUCE BUDWORM  
Choristoneura occidentalis Freeman

Hosts: Douglas-fir, true firs, spruce, hemlock, larch.

Life Cycle: There is one generation of budworm per year. Adults are present during late July and August. Eggs are laid in a mass on the underside of a needle. Eggs hatch in early autumn and the newly-hatched larvae migrate to overwintering sites. They overwinter in silken shelters under bark scales. Larvae emerge from hibernation in June, mine buds and old needles, then feed on the expanding buds. New needles are webbed together in protective nests where the larvae feed until they are mature. Pupae are formed in the silken nests and adults emerge by August.

Damage: Larvae mine buds and old needles in June, then consume new foliage as it appears. After four to five years, branch dieback, top-kill, and tree mortality can occur. Terminal and lateral new shoots are also severed.

Identification: Larvae have brownish heads and bodies and prominent ivory-colored spots. They can be 25-32 mm long when full grown. Pupae are 12-16 mm long and brown.

Control: Ground application of Malathion, Sevin or Orthene can reduce foliage loss on high-value ornamental trees. Spraying should begin as soon as buds begin to open, and should be repeated at two week intervals as long as new feeding damage is observed.

DOUGLAS-FIR TUSSOCK MOTH  
Orgyia pseudotsugata (McDunnough)

So far has occurred only periodically in spot outbreaks in western Montana, the largest of which covered 10,000 acres and occurred in the Rocky Point area near Polson in 1975. Outbreaks in forested areas have often been preceded by damage to ornamental spruce in towns near these forested areas.

Hosts: Douglas-fir, true firs, spruce.

Life Cycle: Overwinters as eggs in a mass of female body hairs stuck together with a frothy, gelatinous substance. Masses are laid on the cocoon from which the female emerged, which can be attached to foliated twigs, trunk, larger limbs, or objects near the tree. Eggs begin hatching when buds burst on hosts. Newly-hatched larvae feed on the tender new foliage. Young larvae are the primary dispersal stage and can be carried considerable distances by the wind on long silk webs which they spin. Pupation occurs from late July to the end of August inside a thin cocoon of silken webbing mixed with larval hairs. Moths emerge 10 to 18 days later. The female moth does not have wings and crawls to the top of her cocoon to await the winged male. After mating, she lays her egg mass on the cocoon.

Damage: New needles are eaten first by young larvae. Larger caterpillars can completely strip all needles from trees. Trees can be killed or top-killed in one year. Continued defoliation also causes marked growth loss.

Identification: Signs of tussock moth are present the entire year. Cocoons and egg masses can be found from August until May. Small larvae are grey with long hairs. Larger larvae develop four dense tufts of yellowish-brown hairs on their backs. Mature larvae

are up to 30 mm long and have two long black pencils of hair just back of the head and another near the tail, as well as the four yellowish tufts. The rest of the body is covered with shorter hairs radiating from red, button-like centers.

Control: The chemical insecticides Sevin and Dibrom are registered for ground application. Spraying should begin as soon as damage or caterpillars are noticed. On trees where egg masses have been previously detected, spraying should be done about one week after the egg masses hatch.

PEAR SLUG  
Caliroa cerasi (Linnaeus)

Hosts: Pear, cherry, plum, quince and apple.

Life Cycle: Winter is passed in the soil inside a cocoon. Adults emerge in the spring after the trees are fully leaved. Females deposit their eggs in slits in the leaves by means of a saw-like ovipositor. Eggs hatch in about a week and larval development is completed in less than a month. Pupation takes place in cocoons in the soil. In late July adults of the second generation appear and lay eggs. On hatching the larvae develop to maturity, enter the soil, and spin cocoons in which they overwinter.

Damage: Feeds as a skeletonizer on the upper surface of leaves. Injured areas turn brown, and if enough leaf surface has been consumed, the leaf drops prematurely. Trees may be completely defoliated.

Identification: In early development, the larvae are green-black, elongate, slim, and slug-like, with very little evidence of legs. As they mature they transform to typical sawfly larvae, nearly 1/2 inch in length, and resemble green-orange caterpillars. Their bodies are enlarged near the head and taper toward the tail. The adult is a glossy black, four-winged sawfly about the size of a housefly.

Control: Trees can be sprayed with Malathion or Diazinon about 15 days after bloom.

ASH BORER  
Podosesia syringae fraxini (Lugger)

Hosts: Green ash and mountain ash. A closely related form infests lilac.

Life Cycle: The ash borer requires a minimum of two years to complete its life cycle. The moths begin to emerge from the host trees in late May and are present until late July. Eggs are laid in bark crevices on trunks and branches, and in bark wounds. The larval period extends from July of the year the eggs are laid to early May of the third year following oviposition. Most of the caterpillars start their burrows in cracks in the bark, with entries marked by bits of fine frass and webbing. At the end of the first season, some of the borers will have penetrated into the wood, while others may remain in the bark. In large trees, the caterpillars bore into the sapwood at a slight incline for one or more inches, then turn upward and outward to terminate the burrows in or near the bark. In small trees or branches the burrows penetrate to the centers and then rise for several inches before turning outward again, or they may pass through to the opposite side. During May of the third season, boring is resumed until only a thin layer of bark or wood remains, behind which the caterpillars pupate. Shortly before moth emergence, the pupae break through this layer and push themselves partially out of the burrows. The moths emerge and escape directly to the outside, leaving their pupal skins protruding from the burrow exits.

Damage: Infested trees are weakened by the burrows and wind or snow breakage is more frequent. Severe infestation can kill trees. All sizes of trees may become infested, but smaller, younger trees appear to be most susceptible. The parts of the tree most frequently attacked are the lower portions of the trunk to ground level and the area where the lower branches arise.

Identification: Adults are wasp-like moths with clear wings. Their bodies are slender and are dark brown with yellowish bands on the abdomen. The wings are narrow with a spread of approximately  $1\frac{1}{2}$  inches. The legs are long and orange. At rest, the moths frequently hold the tip of the abdomen in a raised position. The larvae are tiny, white caterpillars with dark heads when newly hatched. Full-grown caterpillars are creamy white with brown heads, and are about one inch long. Masses of fresh moist frass ejected from the burrows can be seen in June and July. Pupae are about  $\frac{3}{4}$  inch long and reddish-brown, with small backward-projecting spines. Shed pupal skins can often be seen projecting from burrow exit holes of infested trees.

Control: The measures which may be employed involve prevention and applied control. A combination of both is usually desirable.

Prevention: Avoid wounding trees. Where wounds do occur at the base from cultural practices or on the upper trunk from pruning, etc., cover the wound areas with a commercial tree dressing or a suitable water-base paint to eliminate them as desirable egg-laying sites.

Remove and destroy "brood" trees before June. "Brood" trees are those damaged beyond recovery and still heavily infested. Trees which show severe damage to the trunks but which no longer appear to be infested may be saved to give many additional years of service. If the wound areas are cleaned out to protect them, and good growth conditions are provided, new wood will gradually restore the vigor of the trees.

Applied Control: Trapping the moths--where only one or two infested trees are involved and re-infestation from outside sources is small. Tightly wrap the areas on the trunk and branches where borer openings occur, with burlap or cotton cloth, in mid-May to prevent the moths emerging from the burrows and laying eggs. Remove the wrapping about mid-August. The treatment should be repeated for at least three years to ensure that all adults developing from caterpillars in the trees have been destroyed.

Killing the caterpillars--for small trees, particularly green ash, lightly infested with borers. When moist frass appears at burrow openings in May and June, carefully dig out the insects with a pointed knife or kill them by probing the burrows with a wire. Repeat the probing operation at frequent intervals as long as new frass is being ejected. Wound areas should be treated with tree dressing after the insects have been killed.

Trunks of trees can be treated with the insecticide Dursban, which kills newly-hatched larvae as they enter the bark. A commercial borer paste such as Borotox can also be injected into burrows and the openings sealed.

CARPENTERWORM  
Prionoxystus robiniae (Peck)

Hosts: Green ash, mountain ash, poplars, American and Siberian elms. May also attack oaks, maple, willow, cottonwood, boxelder and fruit trees.

Life Cycle: The life cycle is three years or longer. Moths begin to emerge from infested trees in June and may be present until early August. The eggs are stuck firmly to the surface in cracks, crevices and wounds in the bark, or in or near old burrow openings. Eggs hatch in 10 to 16 days. The larval period extends from the July the eggs

are laid to May of the following fourth or fifth year. Young caterpillars crawl about freely on the host trees soon after hatching and often cover long distances on the trunks before beginning to burrow. By August, frass ejected from the new burrows becomes noticeable. In the second and following seasons the burrows are extended and enlarged and usually form a maze of criss-cross tunnels in the wood. In May of the fourth or fifth year, the caterpillars retreat to the upper parts of the burrows where they transform into pupae in specially prepared chambers. Adults begin to appear in June. Before changing to the adult form, the pupae propell themselves downward by means of the backward projecting spines on their bodies to the burrow openings. When the moths emerge from their pupal skins they escape directly to the outside.

Damage: Trees are weakened by larval burrows, which encourages wind and snow breakage. Trees are killed by repeated attacks. The attraction of wounded or previously infested trees for egg-laying, along with the poor ability of the female to fly results in the development of "brood" trees from which numerous moths emerge year after year.

Identification: Adults are large grayish moths. Females are half again as large as males and have a wingspread of 75mm. The wings are uniformly mottled with gray and brown scales, and the male has a yellow-orange spot on each hindwing. Newly-hatched caterpillars are dark brown, slightly hairy, and have a large black head. The full-grown caterpillars are two to three inches long and pinkish white with brown heads. Coarse frass particles and excrement held together by bits of webbing can often be seen at burrow entrances. Frass may also cling ribbon-like on the outside of the trunk or accumulate around the tree base. The pupae are brown and are 1½ to 2 inches long, with circular bands of backward-pointing dark spines. Empty pupal skins can often be seen projecting from burrow openings.

Control: The same measures listed for ash borer apply to the carpenterworm.

PINE ENGRAVER  
lps pini (Say)

Hosts: Ponderosa and lodgepole pines.

Life Cycle: Normally there are two generations a year. During drought years, three and four generations have occurred. Adults usually overwinter in the duff layer near the soil or under the bark of infested material. They infest slash or broken trees during May. The male bores through the bark, constructs a nuptial chamber in the inner bark, and is joined by two to four females. After mating, each female makes a separate egg gallery. Larvae feed on the inner bark for about 30 days, pupate at the end of their mines, and emerge as adults sometime in June or July. Approximately 45 to 60 days are required to complete the spring generation. Adults from this first generation seek fresh breeding material and when slash is insufficient or unattractive, green trees can be attacked. Second or summer generation adults emerge in August and September. Establishment of a third generation is dependent on warm temperatures and low moisture.

Damage: Pine engravers maintain themselves in slash and weakened or damaged trees. Outbreaks can develop in forested areas that kill hundreds of trees. Damage to ornamental trees often occurs when they are adjacent to large outbreaks. Damage has also frequently occurred to pines left for ornamentals in new subdivisions in forested areas, because construction activities often damage root systems which stresses the trees and makes them susceptible to attack. Smaller trees are killed and limbs and tops of larger trees can be killed. Newly transplanted pines are also very susceptible to attack until root systems are reestablished.

Identification: Reddish-brown boring dust can be found in bark crevices. Under the bark, egg galleries form an inverted "Y" or "H" pattern with nuptial chamber in the center, and usually follow the grain of the wood. Ponderosa pine foliage can start fading from 30 to

45 days after tree attack. Adult beetles are reddish-brown and about 4mm long. Their posterior ends are squared off, concave, and bear a number of tiny spines.

Control: Once a tree has been successfully attacked, there is nothing that can be done to save it from being killed. Infested trees should be removed from the area or cut up, piled and burned before the brood emerges to help prevent further attacks of other trees in the area. The bark on the trunk and branches of ornamental pines can be treated with the insecticide Sevimol before beetle flight to prevent attack. The bark must be thoroughly wet to ensure an adequate deposit of the insecticide throughout the flight period, and the entire trunk and larger branches of the tree must be treated.

In housing developments, care should be taken to avoid disturbing the roots of trees that are to be left as ornamentals, as these will often be weakened and later attacked. Weakened or badly damaged trees should be removed prior to completion of construction. Pine slash created by housing developments should be disposed of as soon as possible. It should not be left near ornamental pines as attacking beetles often overflow the slash and infest the leave trees. Back-filling over root areas should be avoided. Four inches or more of dirt over the roots often stresses the trees and makes them attractive to attacking beetles.

Bark Surfaces of newly transplanted pines should be treated with Sevimol for 2-3 years after transplanting, or until root systems become fully established.

COOLEY SPRUCE GALL APHID  
Adelges cooleyi (Gillette)

Hosts: Douglas-fir and spruce.

Life Cycle: The aphid goes through six different generations or forms which take two years to complete on spruce and Douglas-fir. All six forms are present in any one year because generations on both hosts are active simultaneously.

Cycle on Spruce

During August, nymphs feed on current year's spruce needles. This is the only generation that develops into male and female adults. Adults move to nodes of old growth, copulate, and females usually lay eggs singly between the old bud scales and twigs. New nymphs appear in September and feed for a while on the upper surface of needles before overwintering on the stem below buds. These nymphs feed in the spring and start gall formation which is completed by their progeny. Nymphs feed within galls until late August, emerge, and change into winged adults which fly to Douglas-fir and lay eggs on the lower surface of current year's needles.

Cycle on Douglas-fir

Nymphs overwinter on the lower surface of current year's needles and then resume feeding in the spring. Progeny from this generation are two kinds; wingless females which stay on Douglas-fir and reproduce, and winged females which migrate back to spruce in late July and August, thus completing the two year cycle. Only new foliage is fed upon during the summer months.

Damage: On Douglas-fir, nymphs suck the juice out of current needles which turn yellow and fall off. On spruce, nymphs form galls which can kill twigs. Over the years, gall-ing may gradually kill a tree.

Identification: Galls are present on spruce. Unopened galls in late spring with nymphs feeding inside them are green with shades of pink or purple. Opened or old galls are brown and dry. Oval, black nymphs with white wax fringe, or oval, dark brown adults covered with tufts of white woolly wax can be found on Douglas-fir.



Control: The insecticides Lindane and Sevin are registered for spraying ornamental spruce. Sevin should be applied when the insects or their damage first appear. If Lindane is used, it can be applied in early April before buds begin to swell and again in May. Sevin or Malathion will control feeding nymphs on Douglas-fir.

WOOLLY ELM APHID  
Eriosoma americanum (Riley)

Hosts: American elm and serviceberry.

Life Cycle: Overwinter as eggs laid in the fall in bark crevices. In the spring, when the elm leaves are unfolding, the eggs hatch into wingless females which begin to feed on the undersides of leaves. At maturity, these females give birth, without mating, to as many as 200 young aphids, all females. The leaf curls and serves to protect the colony. By the end of June the colony begins to spill over to other leaves and a winged generation matures, again all females, which fly to serviceberry bushes. Once on the serviceberry, they give birth to young, again all females. They crawl down to the roots where several generations are produced underground during the summer. In the fall, winged females are produced underground which migrate back to the elm and start the cycle again.

Damage: Elm leaves are severely damaged, both functionally and in appearance. Heavy infestations reduce tree vigor. Honeydew produced by the aphids is a nuisance.

Identification: Aphid damage is easily recognized by the curled leaves. The aphids, when present, are small, grey and covered with white powdery wax.

Control: Several insecticides are registered for aphid control, including Orthene, Sevin, Diazinon, Ethion and Malathion. The material should be applied in mid-spring when overwintering eggs begin to hatch, and repeated at two week intervals as necessary.

OYSTERSHELL SCALE  
Lepidosaphes ulmi (Linnaeus)

Hosts: Apple, pear and other fruit trees, and many shade and ornamental plants. Lilac, poplar and green ash are often seriously attacked.

Life Cycle: Winter is passed as minute white eggs beneath the female scale. Eggs hatch in late spring, and the tiny nymphs crawl out and migrate over the plant. In a few hours they settle down, insert their mouthparts and begin sucking sap. At the first molt, the legs and antennae are shed, and the molt skin is incorporated in the scale covering formed over the body. By mid-August, nymphal development is completed and winged males emerge and mate with the females, which spend their entire lives beneath the scale covering and deposit eggs in the fall before dying.

Damage: The scales feed primarily on the twigs, branches and thin-barked stems of their hosts. Heavily attacked trees are weakened and sometimes killed. Considerable branch die-back can occur on trees not killed.

Identification: The scale covering is brown or gray and shaped somewhat like oyster-shells. The covering of the female is nearly one-eighth inch long when completed, narrow at the anterior end and widened at the rounded posterior end. The covering of the male is smaller and more oval-shaped. Oystershell scales often occur in such large numbers that they form a crust on the branches of the host.

Control: A late dormant or delayed dormant oil spray can be applied to prevent the eggs from hatching. It should be applied as winter buds swell just before opening or during early green tip stage. The entire plant should be wet, being sure the cracks and crevices

are hit and no terminal buds missed. The ground and all debris around the base of the plants should also be sprayed. The crawling stage can be controlled by spraying with insecticide in late May and June. If dormant sprays are not applied or if infestations are particularly heavy, spray about mid-May and repeat twice at two week intervals. This spray can be omitted if satisfactory control is obtained in the dormant period.

#### EUROPEAN ELM SCALE Gossyparia spuria (Modeer)

Hosts: All kinds of elms, but especially American elm.

Life Cycle: Young nymphs overwinter on the bark, hiding in cracks and crevices for protection. Males form conspicuous white cocoon in early spring and emerge as adults in May. Females lay eggs in June and July. When they hatch, the crawlers swarm over the twigs to the underside of the leaves where they settle and feed until fall. Migration to the limbs or trunk usually occurs before the leaves begin to drop.

Damage: Heavy infestation causes premature yellowing and shedding of leaves and killing of twigs and branches. Small trees may be killed. Associated honeydew and black mold are also a nuisance.

Identification: The immature forms and the white male cocoon resemble mealy bugs. Adult females are wingless and dark reddish-brown in color, with a conspicuous fringe of white cottony wax along the sides. Heavy infestations are accompanied by honeydew, a clear sticky secretion that drips down from the scales and a black sooty mold that develops on the honeydew on the tree trunks and branches.

Control: Control is similar to that listed for oystershell scale. Dormant oil sprays may be applied before the leaf buds swell. Sprays against the young crawlers are applied in midsummer, later than for oystershell scale.

#### PINE NEEDLE SCALE Chionaspis pinifoliae (Fitch)

Hosts: Lodgepole and ponderosa pines, spruce, Douglas-fir, true firs.

Life Cycle: Overwinters as eggs underneath white scales. Eggs hatch from late May to late June. Newly hatched nymphs crawl over the needles for several days, select a needle, and insert their stylets (mouth parts). Females stay on this needle for the rest of their life cycle. Males remain until they become winged adults. Nymphs molt twice and form white scales in August. Females lay eggs under their scale covering in late August and die about one month after oviposition.

Damage: Nymphs suck the juice out of needles and turn them yellowish-brown. Ornamentals become unattractive when covered with white, waxy adults and their secretions. Heavy populations cause needle drop, reduced growth, and possible tree mortality after a few years. Weakened pines are often attacked by bark beetles and wood borers.

Identification: The oblong, flat, white waxy scales, which are about 2-5mm in length, are on the needles throughout the year.

Control: The insecticides Orthene, Sevin, Trithion, Dursban, Diazinon, Ethion, and Malathion are registered for spraying ornamentals, and should be applied when the insects or their damage first appear. Pines or other hosts should not be planted along dusty roads or in areas of heavy air pollution, as these conditions encourage heavy scale infestations.



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